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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No.	Levy 5R
First Inventor or Application Identifier	Kenneth L. Levy
Title	Recoverable digital content degradation methods and apparatus
Express Mail Label No.	EI 847189822 US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

1. [X] * Fee Transmittal Form *(e.g., PTO/SB/17)* *(Submit an original and a duplicate for fee processing)*
2. [X] Specification [Total Pages 12] *(preferred arrangement set forth below)*
   - Descriptive title of the Invention
   - Cross References to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to Microfiche Appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
3. [X] Drawing(s) *(35 U.S.C. 113)* [Total Sheets 1]
4. Oath or Declaration [Total Pages 13]
   a. [ ] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 C.F.R. § 1.63(d)) *(for continuation/divisional with Box 16 completed)*
      i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

5. [ ] Microfiche Computer Program *(Appendix)*
6. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Copy
   b. [ ] Paper Copy (identical to computer copy)
   c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. [X] Assignment Papers (cover sheet & document(s))
8. [ ] 37 C.F.R.§3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
9. [ ] English Translation Document *(if applicable)*
10. [X] Information Disclosure Statement (IDS)/PTO-1449 [X] Copies of IDS Citations
11. [ ] Preliminary Amendment
12. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
13. [X] * Small Entity Statement(s) *(PTO/SB/09-12)* [X] Statement filed in prior application, Status still proper and desired
14. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
15. [ ] Other: .....

16. **If a CONTINUING APPLICATION,** *check appropriate box, and supply the requisite information below and in a preliminary amendment:*

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No: _____/_____

Prior application information: Examiner _____ *Group / Art Unit:* _____

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

17. CORRESPONDENCE ADDRESS

[ ] *Customer Number or Bar Code Label* *(Insert Customer No. or Attach bar code label here)* or [X] *Correspondence address below*

Name	Kenneth L. Levy				
Address	110 NE Cedar St				
City	Stevenson	State	WA	Zip Code	98648
Country	USA	Telephone	509-427-5374	Fax	509-427-7101

Name (Print/Type)	Kenneth L Levy	Registration No. (Attorney/Agent)	
Signature		Date	3/9/00

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STATEMENT CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(b))--INDEPENDENT INVENTOR

Docket Number (Optional): Levy 5R

Applicant, Patentee, or Identifier: Kenneth L. Levy

Application or Patent No.:

Filed or Issued: 3/10/00

Title: Recoverable digital content degradation method and Apparatus

As a below named inventor, I hereby state that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

- [X] the specification filed herewith with title as listed above.
- [ ] the application identified above.
- [ ] the patent identified above.

I have not assigned, granted, conveyed, or licensed, and am under no obligation under contract or law to assign, grant, convey, or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- [ ] No such person, concern, or organization exists.
- [X] Each such person, concern, or organization is listed below.

Acoustic Information Processing Lab, LLC
110 NE Cedar St
Stevenson, WA 98648

Digimarc
19801 SW 72nd Ave. Site 250
Tualatin OR 97062

Separate statements are required from each named person, concern, or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

Kenneth L. Levy		
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Signature of inventor	Signature of inventor	Signature of inventor
3/9/00		
Date	Date	Date

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STATEMENT CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN

Docket Number (Optional) Levy5R

Applicant, Patentee, or Identifier: Kenneth L Levy
Application or Patent No.:
Filed or Issued: 3/10/00
Title: Recoverable digital content degradation: Method and apparatus

I hereby state that I am
- ☐ the owner of the small business concern identified below:
- ☑ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN Acoustic Information Processing Lab, LLC

ADDRESS OF SMALL BUSINESS CONCERN 110 NE Cedar Street, Stevenson WA 98648

I hereby state that the above identified small business concern qualifies as a small business concern as defined in 13 CFR Part 121 for purposes of paying reduced fees to the United States Patent and Trademark Office. Questions related to size standards for a small business concern may be directed to: Small Business Administration, Size Standards Staff, 409 Third Street, SW, Washington, DC 20416.

I hereby state that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

- ☒ the specification filed herewith with title as listed above.
- ☐ the application identified above.
- ☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern, or organization having rights in the invention must file separate statements as to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization having any rights in the invention is listed below:
- ☐ no such person, concern, or organization exists.
- ☒ each such person, concern, or organization is listed below.

Separate statements are required from each named person, concern or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

NAME OF PERSON SIGNING Kenneth L. Levy

TITLE OF PERSON IF OTHER THAN OWNER President

ADDRESS OF PERSON SIGNING 110 NE Cedar Street, Stevenson WA 98648

SIGNATURE [signature] DATE 3/9/00

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Applicant or Patentee: Kenneth L. Levy Ref. No.

Serial or Patent No.: Filed or Issued: Herewith

For: METHOD AND APPARATUS FOR INTELLIGENT CONTENT SCRAMBLING

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR §1.9(f) and §1.27(c)) -- SMALL BUSINESS CONCERN

I hereby declare that I am

☐ The owner of the small business concern identified below:

☒ An official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Digimarc Corporation

ADDRESS OF CONCERN 19801 SW 72nd Avenue, Suite 250, Portland, Oregon 97062

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR §121.3-18, and reproduced in 37 CFR §1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled

METHOD AND APPARATUS FOR INTELLIGENT CONTENT SCRAMBLING

By inventor(s) Kenneth L. Levy

Described in:

☒ The Application Filed Herewith.

☐ Application No. _____ Filed _____

☐ Patent No. _____ Issued _____

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights in the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR §1.9(c) if that person made the invention or by any concern which would not qualify as a small business concern under 37 CFR §1.9(d), or a nonprofit organization under 37 CFR §1.9(e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR §1.27)

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR §1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING William Y. Conwell

TITLE OF PERSON OTHER THAN OWNER Vice-President, Intellectual Property

ADDRESS OF PERSON SIGNING 19801 SW 72nd Avenue, Suite 250, Tualatin, OR 97062

SIGNATURE _____ DATE 3/9/00

RECOVERABLE DIGITAL CONTENT DEGRADATION: METHOD AND APPARATUS

This application claims the benefit of Provisional Patent Applications Ser. #60/123,581 filed 3/10/99, incorporated herein by reference.

Background of the Invention

It is desirable to degrade digital signals in many situations so as to restrict access. For instance, pay-TV broadcasts are degraded so those who haven't paid for the program cannot watch it because the picture is unclear, while those who have paid for the program see a clear picture because their recovery apparatus has been enabled. Most recently, as a result of the digital audio revolution, it is desirable to restrict MP3 (a standard bit-rate compressed audio file format) access. It is also desirable to produce inexpensive portable MP3 players, which in turn require that recovery of the original signal be simple.

There are numerous existing methods of degrading digital content, a.k.a. scrambling. Some methods require a key to de-scramble the content, whereas others do not. Most scrambling or degrading methods are based upon either adding an interference signal to the digital content, or moving the bits around. Other methods use encryption, but this is very computationally intense.

Summary of the Invention

This invention degrades digital signals and recovers them using a method and corresponding apparatus that is extremely simple and efficient to implement. In addition, most configurations of the invented method and apparatus allow self-

synchronization, which means the digital content can be recovered when accessed at any random part of the content. The invented process also has configurations where the original digital data can be recovered from the degraded digital data with or without the need for a key. Finally, the degradation level can be controlled such that the digital content can either be previewed in lower quality before buying, or made totally useless.

The invented degradation process involves searching through the original digital data for detection criteria and then adjusting neighboring points to degrade the content, either without affecting the location of the detection criteria or affecting it in a known fashion so that the original signal may be recovered. The detection criteria may include the relationship between several points, or be as simple as a threshold crossing or include every M^{th} point. The adjustment of the neighboring points may be as simple as multiplying the point after the threshold crossing by N. It is advantageous if N is less than one but not equal to zero so saturation and data points equal to zero are not a problem, and if the threshold is positive and the data is decreasing towards zero during the threshold crossing.

The invented recovery process includes searching through the data for the detection criteria and then re-adjusting neighboring points to their original value. For example, if the adjustment in the degradation process uses multiplication by N, the recovery process multiplies by 1/N.

The corresponding apparatus includes a logical processor and memory unit. The logical processor is used to search for the detection criteria, then either adjust to degrade or re-adjust to recover the original

data point(s). The memory unit is used to hold the previous point(s) necessary to find the criteria location, and the buffer, if using buffered data.

Brief Description of the Drawings

FIG. 1 is an overview of the degradation and recovery process.

FIG. 2 is the pseudocode for the degradation and recovery process.

FIG. 3 is a simple and efficient example of the degradation and recovery process using a threshold crossing and adjusting only the next point.

FIG. 4 is the pseudocode for the simple and efficient example of the degradation and recovery process.

FIG. 5 is an overview of the apparatus required to implement the invented process.

Detailed Description

Below please find the definitions to terms and concepts that are used throughout this document. Digital content refers to digital data representing a perceived physical item, including but not limited to audio, video, and images. Digital data refers to the grouping of bits (1's or 0's) that represent a sample of the original digital content at an instant in time. Each bit group is equivalently referred to as a data point or sample. The data points are arranged in an order, many times representing a sequence versus time or frequency. In addition, the data points may be grouped again to form a subgroup, possibly used to represent a sequence versus frequency versus time, as is the case in MPEG standard compressed digital audio and video. Most importantly, the digital data has an order, with a beginning and end, such that *searching*

the data is possible, and neighboring points can be defined as points close to each other. Finally, point(s) refer to one or several points.

Fig. 1 displays an overview of the degradation and recovery process, and Fig. 2 displays the corresponding pseudocode to be implemented by the apparatus.

To degrade the digital content (box **100**), the samples are searched for the detection criteria (boxes **200**, **210** and **220**). The searching stops after the last data point in the buffer has been examined (box **210**), and a new buffer may be presented if available. As known in the state of the art, data values must be saved between buffers and properly initialized for the first buffer so as the initial points are properly searched.

When the detection criteria are found, the neighboring data point(s) are adjusted so as to cause content degradation (box **230**). The adjustment of these points should not change the location of the detection criteria or change it in a known fashion; otherwise, the detection of the correct location to re-adjust the data to its original value (recovery) is not easy. In addition, it is desirable to prevent the adjustment from causing saturation or resulting in a value of zero, because then the original data point(s) will not be easily recoverable.

To recover the original digital content (box **110**), the degraded data is searched for the detection criteria defined by the degradation process (box **200**, **210**, and **220**). If the degradation process has changed the detection criteria in a known fashion, then the detection criteria in box **220** for recovery is different than that used in degradation. When the criteria location is found, the neighboring data point(s) are re-adjusted by the inverse of the method used *in the*

degradation process (box **230**).

An example of this process is shown in Figs. 3 and 4. In this case (boxes **300** and **310**), the detection criterion is a threshold crossing (using c-notation: x[n-1]>thr && x[n]<thr) with a positive threshold (thr>0) while the data goes towards zero (boxes **400**, **410** and **420**). The neighboring point(s) include only the point after the threshold crossing (box **430**). To degrade the data, the adjustment involves multiplying the data point after the threshold crossing (x[n]) by N, where N is less than 1 (box **430**). By reducing the value of this data point, the detection criteria location is not changed. In addition, the closer N is to 0 (but not equal to 0), the more the digital content is degraded. To recover the original digital data, the point after the threshold crossing (x[n]) is multiplied by 1/N (box **430**). Care has to be taken that quantization errors do not degrade the recovered content quality. Obviously, without quantization, the recovered content will be identical to the original content.

There are additional simplistic detection criteria that can be used. For example, every M^{th} data point may be degraded. In this case, synchronization for recovery may require scanning the data for M points until the correct degraded locations are found. In addition, peak values could be used, and the point after the peak could be reduced in value. As desired, this will not affect the detection criteria for the recovery process. Alternatively, threshold crossings with a negative threshold and the data moving towards zero are viable. Again, the data point after the threshold is reduced in absolute value towards but not equal to zero. For these last two cases, synchronization for recovery automatically *occurs when*

searching the data.

Although, in this preferred configuration, the detection criteria do not change between degrading and recovering the original digital data, this is not an absolute requirement. The detection criteria may change, if in a known fashion, such that the recovery process uses a different but known detection criteria than the degradation process. In other words, box **420** (or **220**, as discussed above) would be different for the degradation and recovery process.

The original content need not be represented by digital samples versus time, as one may have assumed. In many cases, such as using MPEG compression (i.e. MP3 audio), the digital samples represent subgroups of frequencies versus time. In this case the data may be searched across frequency for each subgroup, or across time for each frequency, or in any other but well-defined combination. The data may also represent either the frequency magnitude or corresponding scaling factors.

It is important to note that there are alternative ways to recover the content while removing most of the perceptual degradation caused by this degradation technique. For example, a pirate could use a low-pass filter to render reasonable content from the degraded content. The recovered digital data will not exactly match the original digital data, but its perception may be acceptable. As well know by one familiar with the state of the art in DSP, filter characteristics such as type and order will affect the recovered data.

Alternatively, one could use pseudo-random sequences (a.k.a. a key) to set the detection criteria (box **220**) or the adjustment or re-adjustment of the data (box **230**). This randomness increases the difficulty to illegally recover the data. For example,

a pseudo-random number greater than zero but less than one could be used as the scaling value N (box **430**). Or, a pseudo-random number between minimum and maximum threshold could be used for the threshold (box **420**). All that matters is that the degradation and recovery process use the same pseudo-random sequence. However, this configuration requires sending a key along with the data. The key may be embedded within the data using known techniques, such that the original data is still recoverable from the degraded data.

Fig. 5 shows the hardware apparatus required to implement the invented degradation and recovery processes. The hardware includes a logic processor **500** and a storage unit **510**. The logic processor **500** may be defined as the equivalent of a digital signal processor (DSP), general-purpose central processing unit (CPU), or a specialized CPU, including but not limited to media processors. A likely DSP chip is one of the Texas Instruments TMS320 product line. A CPU could include one of Intel's Pentium line or Motorola/IBM's PowerPC product line. The design of code for controlling logic processor **500** is simple for someone familiar with the state of the art given the above pseudo-code and description. The storage unit **510** includes RAM when using a digital processor, and is required to store the current buffer and/or previous point(s) for the detection criteria.

In addition, a person familiar with the state of the art could implement the logic processor **500** with analog and digital circuitry, either separately or in an application specific integrated circuit (ASIC). The analog and digital circuitry could include any combination of the following devices: digital-to-analog converters (D/A), comparators, sample-and-hold circuits, delay elements, analog-to-digital converters

(A/D), and programmable logic controllers (PLC).

In summary, the main advantage of this invention is that it is an extremely simple and efficient method and apparatus to protect content as compared to prior-art scrambling and encryption methods.

The foregoing descriptions of the preferred embodiments of the invention have been presented to teach those skilled in the art how to best utilize the invention. Many modifications and variations are possible in light of the above teaching. For example, as discussed, there are many detection criteria and adjustment schemes that are similar to those described. To this end, the following claims define the scope and spirit of the invention.

Claims

I claim:

1. A process that includes searching the digital data for detection criteria and adjusting neighboring point(s), whereby the digital data is degraded in quality but the original signal is recoverable.
   2. The process of claim 1 in which the detection criteria involves a pseudo-random sequence, thereby increasing the difficulty to illegally removing the content degradation.
   3. The process of claim 1 in which the adjustment of neighboring point(s) involves a pseudo-random sequence, thereby increasing the difficulty to illegally removing the content degradation.
   4. The process in claim 1 in which the detection criteria includes a threshold crossing, thereby the degradation process is simple and efficient.
      5. The process in claim 4 in which the value of the threshold is a pseudo-random sequence, thereby increasing the difficulty of illegally recovering the original signal.
      6. The process in claim 4 in which adjustment of neighboring points includes scaling the point after the threshold crossing, whereby the degradation process is simple and efficient.
         7. The process of claim 6 in which the scaling value is a pseudo-random sequence, whereby increasing the difficulty of illegally recovering the original signal.
   8. The process in claim 1 in which every Mth point is degraded in quality.
   9. The process in claim 1 in which the content is recovered with a filter that removes most of the content degraded.

10. A process which includes searching the digital data for detection criteria and re-adjusting neighboring point(s) whereby the original digital data is recovered from the degraded data.

11. The process of claim 10 in which the detection criteria involves a pseudo-random sequence, thereby increasing the difficulty to illegally removing the content degradation.

12. The process of claim 10 in which the adjustment of neighboring point(s) involves a pseudo-random sequence, thereby increasing the difficulty to illegally removing the content degradation.

13. The process in claim 10 in which the detection criteria includes a threshold crossing whereby the recovery process is simple and efficient.

14. The process in claim 13 in which adjustment of neighboring points includes re-scaling the point after the threshold crossing by the inverse of the scaling value used in degradation, whereby the recovery process is simple and efficient.

15. The process in claim 10 in which every Mth point is recovered from the degraded digital data.

16. An apparatus consisting of a logic processor and storage unit with a means to implement the efficient and self-synchronizing degradation or recovery process, whereby the apparatus is inexpensive.

17. The apparatus of claim 16 in which the logic processor is a digital processor.

18. The apparatus of claim 17 in which the memory unit is digital random access memory (RAM).

19. The apparatus of claim 16 consisting of a combination of custom digital and analog

circuitry.

20. The apparatus claim 16 which implements a filter that removes most of the degraded content.

Abstract of the Disclosure

In many situations, it is desirable to restrict access to digital content. This invention presents an extremely efficient and simple method and apparatus to degrade and recover digital content. The invented process is based upon searching the data for detection criteria and then adjusting neighboring point(s) to degrade the content, or re-adjusting the neighboring point(s) to recover the original content. For example, one could search for threshold crossings, and scale the following point by a number between 0 and 1 for degradation, or re-scale the following point by the inverse scaling value to recover the original data. The apparatus includes a logic processor and storage unit to implement the degradation and recovery process.

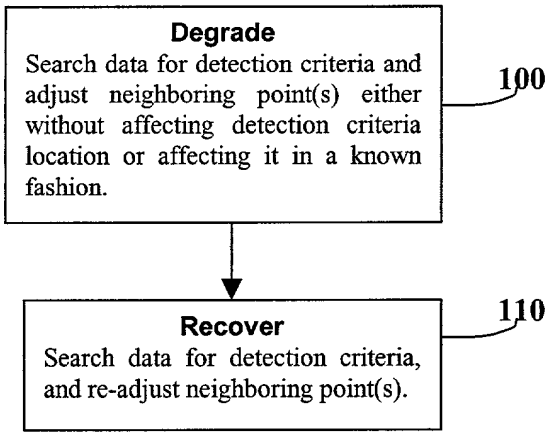

Fig. 1

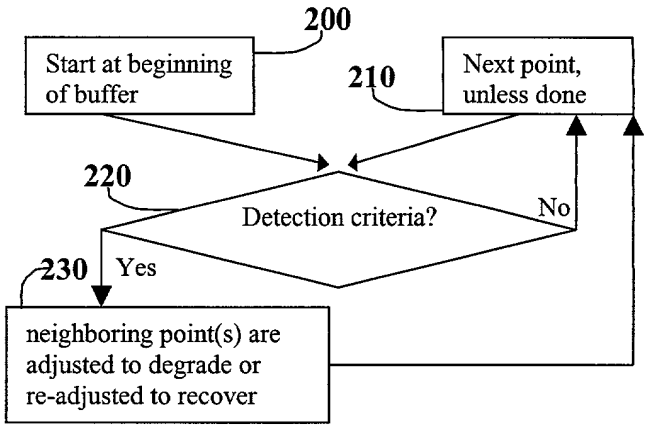

Fig. 2

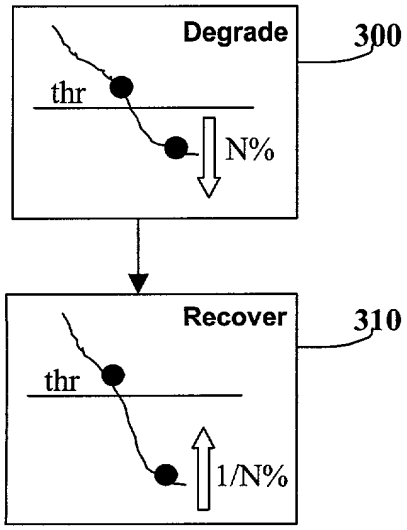

Fig. 3

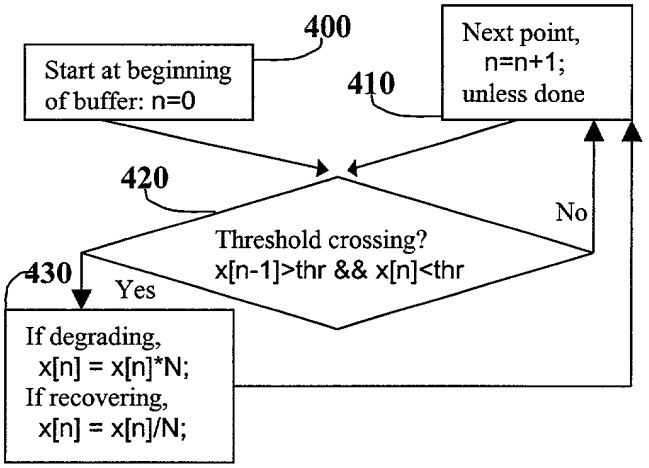

Fig. 4

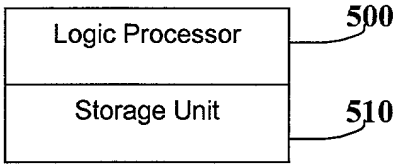

Fig. 5

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

[X] Declaration Submitted with Initial Filing OR [ ] Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	Levy SR
First Named Inventor	Kenneth L Levy
COMPLETE IF KNOWN	
Application Number	/
Filing Date	3/10/00
Group Art Unit	
Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Recoverable Digital Content Degradation Method and Apparatus

(Title of the Invention)

the specification of which

[X] is attached hereto

OR

[ ] was filed on (MM/DD/YYYY) _____ as United States Application Number or PCT International Application Number _____ and was amended on (MM/DD/YYYY) _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]

[ ] Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	
60/123,581	3/10/99	[ ] Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

Burden Hour Statement: This form is estimated to take 0.4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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DECLARATION — Utility or Design Patent Application

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number *(if applicable)*

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As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: ☐ Customer Number → *Place Customer Number Bar Code Label here*
OR
☐ Registered practitioner(s) name/registration number listed below

Name	Registration Number	Name	Registration Number

☐ Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/02C attached hereto.

Direct all correspondence to: ☐ Customer Number or Bar Code Label [ ] *OR* ☒ Correspondence address below

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	Family Name or Surname
Kenneth L. Levy	Levy

Inventor's Signature						**Date**	3/10/00
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Post Office Address							
City	Stevenson	**State**	WA	**ZIP**	98648	**Country**	USA

☐ Additional inventors are being named on the ____supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto